

# Assigning Meaning to Emotional Arousal and Experience



Mukundan C. R.



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**Prof. Mukundan C. R.**

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# Message from the Desk of Editor

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This gives me an immense pleasure to announce that ‘RED’SHINE Publication, Inc’ is coming out with its third volume of peer reviewed, international journal named as ‘The International Journal of Indian Psychology. IJIP Journal of Studies’ is a humble effort to come out with an affordable option of a low cost publication journal and high quality of publication services, at no profit no loss basis, with the objective of helping young, genius, scholars and seasoned academicians to show their psychological research works to the world at large and also to fulfill their academic aspirations.

The International Journal of Indian Psychology welcomes submissions that explore the social, educational and psychological aspects of human behavior as related to human. Because The International Journal of Indian Psychology takes a broad and inclusive view of the study of both psychology and social science, this publication outlet is suitable for a wide variety of interests. Appropriate submissions could include general survey research, attitudinal measures, research in which criminal justice practitioners are participants, investigations into broad societal issues, or any number of empirical approaches that fit within the general umbrella provided by the journal.

At last, our thanks go out to the members of the journal who have done their best to work at this collaborative effort. May you continue in this wonderful spirit, which, we are sure will sustain your efforts in the future towards enhancing and enriching this journal.

**Prof. Suresh Makvana, PhD<sup>1</sup>**  
(Editor in Chief)

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**Prof. C.R. Mukundan** has been working in the area of Cognitive Neuroscience since 1964 and he set up the first cognitive electrophysiology laboratory at the National Institute of Mental Health & Neuro Sciences, Bangalore, India in 1975. He conducted research in the area with a team of faculty and students from the Departments of Clinical Psychology, Psychiatry, Neurology, Neurophysiology, and Neurosurgery. They worked on EEG with computerized analyses, Evoked, and Event Related Potential paradigms in schizophrenic patients, patients with alcohol dependence and patients with traumatic brain injury, etc. for the next 3 decades. His latest experimental work was in the area of testing the EEG and ERP activation patterns in remembrance of experiences, and he succeeded in developing a technology, which came to be called Brain Electrical Oscillations Signature (BEOS) profiling. The patented technology has been since used as an aid for forensic investigation. Other than the original normative study, several hundreds of cases have been examined by the test and it has successfully helped the investigators to identify real perpetrators, and the resultshelped exoneration of innocent individuals. The technology that he started trying out, when he was in NIMHANS, got the software developed by Axxonet Technology Solutions in Bangalore. The technique helps to test different possible formulations and different roles played by the individuals suspected or accused to be involved in an act. The important advantage of the test is that it does not expect any behavioural or oral response from the individuals when they are expected to listen to set of verbal probes during the test. Further, the system presents the probes only if the subject is attentive. The system automatically conducts extensive signal analyses to determine presence of sensory registration, semantic processing, accessing source memory, attentional shift, presence of imageries, and emotional responses using frequency and time domain analyses of EEG after determining their statistical significances.

He has been working on understanding cognitive processing methods. He was one of the first few who reported on the sequential and simultaneous nature of signal inputs into the brain and their differential effects on the development of processing methods in the brain. The neuropsychological tests that he developed in the early 1970s had shown that encoding in both visual and verbal tasks could be impaired in left frontal lesions. Similarly, he had developed tests of working memory and used it as a sensitive test in frontal lobe lesion patients. The Brain Function Therapy system that he developed for computerized cognitive retraining has been since

then, extensively used for cognitive training of children with learning disorders, ADHD, and patients with addiction and traumatic brain injury.

He assembled EEG amplifiers for his laboratory in the 1980s, and published the first research papers using computed EEG analysis, EP, and ERP measures from India. His work supported the notion of automatic initiation or neurogenesis of actions, which helped the postulation that action is automatically initiated when emotional arousal reaches a Critical Level of Potentiation. He suggested strict social conditioning as the only neurodevelopmental method and remedy for training in the control of emotional arousal in individuals, which would beneficially help the society, as individuals would learn to control themselves by blocking asocial behaviour. He has been working on the role of emotion for a decade, though could come out with an explicit theory only now, which is considered an alternative to consciousness.

Since March 2013, he is working at Institute of Behavioural Science, Gujarat Forensic Sciences University, Gandhinagar, Gujarat as the Director and Emeritus Professor. In this short duration he has established state of the art Neurocognitive Electrophysiology Laboratory at IBS. The lab consists of 32, 64 channels EEG and ERP systems, Neurofeedback systems, Polygraph and BEOS systems, and Brain Function Therapy for cognitive retraining programs. He started India's first Neuropsychology and Forensic Psychology postgraduate courses, which are flourishing under his guidance. He has organized various seminars, conferences, and workshops in the area of Neuro and Forensic Psychology at IBS. He is also conducting various training programs for Neuro/Forensic psychologists and police officers across the country at IBS. He has also established the Cognitive Neuroscience Society of India (CNSI) in 2014. He is the first President of the society. He has published several original research papers in peer-reviewed journals. He has written three books in his areas of interest.

## **EMOTION**

Prof. C. R. Mukundan has been working on understanding the role of emotion in the control of actions and responses. Arousal has been already identified as a drive necessary for initiation and execution of action (Yerkes, Dodson, 1908). Mukundan et al. (2014) proposed the specific role of emotional arousal in the initiation of actions in human beings. Action is automatically initiated when emotional arousal reaches a Critical Level of Potentiation (CLP), and the only control one could learn to have on own actions is by learning to control the associated emotional arousal. This control has to be acquired through social conditioning within the society, family, schools, etc. Mukundan (2016) proposed emotional arousal as the fuel of life, equivalent of consciousness, as the word consciousness has become a semantic fallacy. This could explain how violent acts are automatically initiated in human beings, as they could not control their emotional arousal, initiated and strengthened in cognitively wrong situations. Providing scope and opportunity for learning emotional control through social conditioning in each growing child, is an important role and responsibility of a society.

Experience of emotional arousal during actions and responses render them memorable and they become part of the autobiographic memory of the individual. Actions executed without emotional arousal may also be stored, but one may not have any source memory to retrieve them later. This has been so clearly and strongly proven by using the Brain Electrical Oscillations Signature (BEOS) profiling technique developed for testing the presence of autobiographic memory. He further examined the nature of emotional arousal, and observed that primary emotional arousal is nascent without any positive or negative valence. He proposes that several traditional practices like meditation, praying, singing, listening to certain types of music, dancing etc. induce and strengthen such emotional arousal in the individual. The cognitive processing and labelling of the emotional arousal and the associated sensory-motor experiences, their immediate and distant effects lead to making positive or negative valence for the emotional arousal. Such cognitively controlled emotional arousal may produce psychological and psychophysiological imbalances, which are now treated by cognitive behavior therapy techniques, which help to correct the original errors or imbalances made in the cognitive appraisal of the nascent emotional arousal. Learning to experience nascent emotional arousal enhances personal strength of the individual, and the experience is blissful and happy, filling eyes with tears.



The most important aspect of the recent articles on emotion by the author is his proposal that emotional arousal is the true driving force in living beings, and concept of consciousness is a semantic fallacy. Emotional arousal indeed has a subcortical origin, though its strength and capability to initiate actions may be controlled by cognitive judgments that take place at cortical level. Learning control of emotional arousal is indeed an important aspect of socialization of human beings, and this control has to be cognitively strengthened in each individual. Such control has to be learnt through practice, which may largely involve semantically originated controls of the activities of the motor system. The responsiveness of the motor system is at the focus of such controls, one learns through practice. Learning to enhance as well as inhibit emotional arousal are both required for one to achieve various goals in life.

## ABSTRACT

Nascent emotional arousal has been considered as the driving force or fuel of life for initiation and execution of actions and responses (Mukundan 2016). The nascent emotional arousal gets labelled through cognitive processing as positive or negative emotion, which may become pleasant or distressing to the individual. However, it is now a regular therapeutic practice to consider such cognitive labelling, which produces psychological and physiological distresses, as erroneous, and to help individuals change the related cognitive processing so that the distress and its psychophysiological consequences are removed. This clearly indicates that the primary emotional arousal is devoid of such effects and the article makes effort to examine the nascent state of emotional arousal. It is also proposed that several ancient practices like meditation, praying, singing and listening to devotional music, and dance movements, etc. may facilitate the creation and maintenance of such nascent emotional arousal, which gives opportunity to the individual not get dragged into personally gratifying or distressing cognitive processes, and conversion of nascent emotional arousal into gratifying, or distressing emotional experiences, which may further produce traumatic psychophysiological and behavioral effects. Such nascent emotional arousal has been proposed as alternative to the concept of consciousness, which is considered a semantic fallacy. However, almost automatic cognitive self-appraisal of emotional state leads to recognition of emotional arousal with positive or negative valences, which may facilitate or inhibit individual's performance capabilities. Learning to recognize the nascent emotional arousal, which one may succeed in experiencing through the practice of meditation and other methods described above, may become a valuable self-enriching practice and experience for each human being. Human brain alone appears to have the capability to entertain such nascent emotional arousal and capability to develop methods that facilitate a larger objective vision of the happenings, or delay the development of distressing cognitive appraisal, initiated by a sensory-motor experience.

### **Absolute vs. Relative Concepts of Consciousness**

Understanding the etiology of mind has seen several controversial paths. To start with, mind was considered an independent entity, often equated to consciousness in the early philosophical thoughts. Methodical views of presence and genesis of mind have been worked out by many over centuries, though several of these efforts did not consider the genesis of the mind from the explanations created, as they followed the same logics and conceptualizations by early philosophers or thinkers that mind is a functional entity within the body. The main difficulty and obstacle for understanding the mind came from the belief that each living body possesses a soul and the soul interacts with the mind. Soul is considered the life force in the individual. Millions of the souls were later considered part of a larger and common life force, which is shared by each body. As soul cannot scientifically be detected or measured, it has been considered an entity, which one can only infer from experience. Scientific evidences have been considered waste of effort, as scientifically the soul cannot be known and proven. Nevertheless, this has been lately handled by using quantum theory, which explains the complex combination of matter and energy

at the most basic levels, known as atomic or subatomic levels. Quantum theory became the foundation for a new theoretical basis for explaining the energy distribution and formation of matter in the universe. Energy has been considered consisting of individual units or quanta, and their combination constitute the matter and its properties. The quantifiable properties and values of energy of two units are considered to vary constantly, giving rise to an “uncertainty principle,” which constantly changes the objective reality of the world. Max Plank, Einstein, Werner Heisenberg, Niels Bohr and others (Cassidy 1994) take us to the original thoughts of quantum theory explaining the composition of matter, which forms the universe. Ideas came up explaining how the same energy may form the foundation of consciousness in living creatures. Consciousness was later considered equal to the soul, as the source of life energy present in ‘quanta’ in the body. Interestingly the ancient Indian concept of “Parabrahma” describes the simultaneous existence of combinations of ultra paradoxical qualities of the world. An Indian God has the body of a man, head of an elephant with trunks and tusks, with four hands, and he travels on a mouse! Can there be a better way of conveying the complex nature of reality of the universe in absolute terms? Thereby, all opposite qualities coexist and are parts of the same reality, though man is capable of recognizing and knowing only parts of it at a time, thereby creating a notion of uniform and continuous flow of reality.

Human being is trained to recognize and know a uniform world, work and live in that uniform world, instead of continuously dealing with the changes and contradictions of the real world. Knowing and experiencing are therefore different mental processes, as far as diversities of the outcome created. Knowing provides information of changes contributed from the sensory-motor experiences, and other changes, which may not be detected through sensory-motor systems but only be detected by scientific methods. Knowing may involve semantic specificity, which may provide a specific meaning, and not experiential specificity. Experiencing indeed is the direct sensory-motor process of establishing contacts with the reality, which is interpreted and understood by the knowledge base of the individual. The experiential reality is therefore the outcome of the knowledge base used by each for interpreting the experiential contacts with reality. Thus, obviously the world each one lives is experientially a self-creation. Objectively, the world consists of distribution of quanta of energy in different formats, which do not directly represent any of those realities composed using multiple conceptual and functional formations and their interpretations. Therefore, the world that we experience is a virtual world or world of “Maya,” and we live in that world, accepting its components as realities. The concept of illusion representing Maya may therefore be taken to reflect the ancient wisdom, as they could conceptualize a relative presence of the world, as absolute reality is Parabrahma! The relative world is governed by scientific rules, as opposite principles cannot simultaneously function or exist in it, as they are conceptualized in Parabrahma. For example, if water is heated, it can only boil; it will not turn into ice. To that extent, we are governed by scientific rules, which must be applied in a relative manner and never as absolute truth. The very genesis of the concepts of space and time are relative, and everything measured in these dimensions can have only relative

presence. The sensory-motor systems help create the knowledge of realities of the universe through semantic processing and scientific experimentations, which may require critical - logical thinking for creating relationships and their scientific verifications. However, many have difficulty in accepting this rule of scientific principles, beyond matter, especially when they propose the presence of a soul. The word consciousness is also used by many beyond its medical or neuroscience references. They consider consciousness as a universal energy, as could be speculated in quantum physics. Contradictions and conflicts occur only when both science and the nonscientific thoughts are considered simultaneously, as done by many. Equating and accepting the cognitive processes and its contents as equivalent is erroneous, and leads to wrong modeling of the entire phenomenon. Scientifically mind has been accepted as a functional property or phenomenon created by the neural cells in the brain. The reservoir of emotions, their experiences, and ideas, which are different in each individual, may be called the mind, may also be referred as the self, as the combination of these with sensory-motor referrals is unique to each individual (Mukundan, Ajayan 2011). These explanations have been extensively supported by studying the neurodevelopment of mental functions from infancy, neuropsychological effects seen in innumerable clinical studies with focal and diffused brain lesions, and the results of functional neuroimaging and related studies. Thus, a mental process is an acceptable scientific reality, but the contents of thoughts are essentially imaginary or what we call semantic creations. Semantic creation is proposed as the most important functional processing ability of the brain (Rappaport 2005, 1999; Mukundan 2015). What is semantically created may represent reality or merely fictional ideas unless and until we can experimentally prove the reality or create a physical representation. This semantic and symbolic processing are the essential characteristics of mental processing and they represent the process of creation of mental products, which may be merely ideas, symbolic and physical representations of reality. We refer to them as experiences, which may be real or imaginary, or partly both. The idea created mentally within the brain, may represent a relationship elsewhere in the world outside. Further, everything that we perceive, deal with parts of realities of the world, which can be explained only scientifically, though we may still be ignorant about several aspects of certain realities. Mental processes are created by allowing the brain carry out signal processes related to recognitions and interpretations of relationships at semantic and symbolic levels, which emerge as concepts and ideas. This world may be the best scientific representation of reality, second to experience, but more reliable than the subjectively experienced word of reality. Experiencing is the only and greatest subjective method of establishing reality contacts and reality verifications. Sensory and motor contacts are the chief contributors of experience, and their processing are semantically or symbolically assembled, which help labelling emotional arousal and emotion induced actions and responses, all of which we consider as mental processes. The mentally created world thereby, represents the mind of the individual, as all relationships with reality are mentally created and they are mentally meaningful to the individual. The mentally created world is therefore a symbolic representation of the real world, which is constituted by cluster of particles of energies with different values. However, what is experienced by one may be just what is

suggested by another or the self, which may not be really present at all (Mukundan et al. 2013). Similarly, a cup of tea or coffee, one may drink in a five-star hotel will be experienced sublime and superior to the same that one may have from a small roadside restaurant, though no chemical examination may prove that the contents of the two are different.

### **Relative Semantic Reality**

The unanswerable question is about the presence of relative reality – the scientific reality, as we understand. Is this world, merely creation of the human mind? What is the nature of the world, which is beyond the human understanding or mental creations? Is not conceptualization of absoluteness a semantic or logical fallacy? All scientific explanations are based on the best scientific knowledge that man has derived. However, scientific knowledge of matter may keep changing and growing, which obviously changes the explanations. Similarly, is it not relativity in judgment a limitation of conceptualization and measurement? Semantic processing, thinking or verbalization in speaking or writing, and other symbolic representations are sensory-motor methods of the brain for creating meaning. Creating meaning and making reality contacts are independent processes. Presence of a meaning or a functional relationship may need verification, which we carry out with subjective or objective methods. Subjective verifications are experiential, whereas objective ones are experimental, mostly independent of experience. Experiential verifications depend on the knowledge base used by the self for interpretations, whereas objective ones need to be carried out independently and repeatedly. Suggestions by the self and from outside may play an important assertive role in experiential verifications, whereas critical thinking alone may partly or fully help objective verifications and it may remain a continuous process, when the explanations may keep changing, as knowledge base may be refreshed and recharged. Experience is always considered the ultimate proof of reality.

Experiential and experimental verifications are necessities of life. Living depends on experiential verifications, when reality contacts are made for personal movements, and with other individuals, pets and other living beings, and for handling movements of other stationary and moving objects. When we need to possess symbolic positions and possessions, many may still want only experiential verifications while some may choose objective experimental verifications. Scientific verifications are sought when life is in danger, or when they are instructed to or need to look for such verifications of specific courses of actions. There may be a few, who always seek objective verifications, as a living principle. As the world with all its variations, which could be scientifically assessed and known to man, is a relative world and not an absolute reality, what do we do with the relative realities which we come to experience and know? We normally believe in our experiences and accept them as personally verified realities. We may consider the mental world that we create a relative or absolute reality. In fact, we can hardly master the total knowledge of the relative realities, as they may be so immensely large for one brain to process and learn. On the other hand, mind can easily create absolute realities and

even believe that it has experientially come in contacts with all of it. Most of the minds are used to thinking of relative truths, as well as accepting absolute explanations. There are many minds, who may accept only absolute realities, though they share the facilities of the new world, which are created by other human beings. There are also minds, who want answers from both the domains, who believe it logical and a necessity to find answers in both the spheres, who will never be satisfied by the limitations in each domain. There may be only a few minds, who could accept the limitations of scientific thinking, and who could accept the limitations of the mind and the world that the mind has created using scientific principles, and still live comfortably with peace of mind and enjoy the fictional world that one has created. One must learn to enjoy the immediate effects from their critical sequentially, their distant effects and outcome, as well as know how the minds may assemble multiple units of information to create a holistic experience.

### **System Approach in Human Life**

Animals live a biological life composed of eating, growing, mating, fighting for survival, and surviving. On the other hand, many human beings believe that they will continue living in a heaven or hell, even after death, or may be reborn as another person in the same world. They entertain a belief and live according to a thought that they are destined to live with a purpose. There are many, who enjoy making a purpose for themselves and lead the life for achieving that. They believe that they will serve that purpose by achieving several of those goals in life. For achieving the goals, they must act, for which they must learn new skills and knowledge. Life becomes a process of navigation, and not merely a process of responding to nature. Purpose is an idea, semantically created, may indeed be called a creation of the mind, which describes a rationale for efforts of man to learn and grow. Purpose helps man to live in a society, create social systems for human beings, who will live serving those purposes. Man has made multiple interconnected systems, and belonging to each system serves a purpose. Even animals may create systems when they need to respond to their biological needs in the presence of environmental limitations or threats. The general system theory conceptualized first by Ludwig Von Bertalanffy (1962, 1974), Peter M. Senge, (1990), and later by Stephen Hawking (Stephen W. Hawking, 2006; James B. Hartle, Stephen W. Hawking, Thomas Hertog 2008; Stephen Hawking, Leonard Mlodinow 2010) and many others explained interconnections across all big and small events in the universe in a nonlinear manner (Chaos theory). Distant events may not be interconnected as between temporally close two sequential events, one occurring after the other, which help to understand the stream of scientific reality. The sequential contributions, however small may be, may also add to a nonlinear and indirect influence to pave the path for sequence of changes. It is not enough to claim how a butterfly effect may culminate into a storm over a period. It is important to explain how such changes could have really occurred, if it happened, whenever a storm took place. Man grows and learns from infancy, and must acquire several skills, which enable each person to execute actions both mentally and physically. Actions are not mere responses to nature's demands; they are executed for creating new realities or mentally solving problems. Man has to assign a meaning to every act and response, and the

same meaning must be understood by others, who may witness or get to know the actions. Only then, an intended effect may be produced. If such meaning is not conveyed, the distant effect may be only because of the presence of physical realities over time. We thereby live in two worlds, one is directly created and projected by us and the other is made by the effects of physical realities, influenced and created by us. Mental creations are essentially semantic ones and part of problem solving efforts. Designing actions may require complex planning using verified scientific principles. As people live in a group, they learn to accept the needs of others and respect their actions. They learn to live together by respecting the rights of one another to carry on with the same regime of life and gain common benefits by sharing ideas and facilities. As emotion is the driving force in them, they learn to experience and express emotions for facilitating the needs and actions. Every emotional arousal is identified with the cognitive judgment used for recognition, responses, and actions, which may give most of the emotions positive or negative valences. There may seldom be any emotional arousal, which one may find difficult to identify positively or negatively. It becomes a habit with most individuals to identify even the mildest form of emotional arousal in a cognitive context and label it positively or negatively. As long as, such identification of cognitive judgment is useful to the individual, the effort is reinforced, and it becomes a regular habit. The cognitive processing facilitates the creation of meaning of the input signals, helps in responding, initiating actions, and monitoring the effects of results of the actions executed. The process also accomplishes identification of the body and parts, which form the source and support for thinking, responding, and emoting, as the self. Verbalization of all these facilitate the development of verbal self-awareness.

### **The Second Signal System: Semantic Interpretations**

There may be many significant differences among the signals that enter and leave a living and nonliving system. The responses of a nonliving physical matter are mainly dependent on the physical and chemical effects of the signals entering, whereas the changes occurring within and by a living system may comprise of responses, which we call behavior, made after interpretations of the signals detected based on personal preferences or critical judgments. These assigned meanings of signals may determine both immediate and distant effects. The changes that occur in a nonliving matter may be linear and predictable, whereas many of these may essentially be nonlinear and even unpredictable in a living system. The value of signals in the second signal system often become more important for a living being, and the values in the second signal systems are cognitively processed and interpreted. Semantic interpretations are the most common cognitive processing effects of these signals. Sequential and simultaneous semantic interpretations help create meanings beyond the first signal system level and help create a world, which exist only at the semantic levels. This results in the creation of a semantically comparable or different world from the realities present, which are experienced differently and uniquely by each individual. Human beings learn to experience this semantic world and these experiences become the core of living for each one. The semantically meaningful experiential reality becomes more important than physical reality for man. The realities conceptualized may be

experientially unique for each individual, as the semantic significances of each component may have unique value to each one. Emotional arousal is the prime indicator, which is used to differentiate experientially the semantic effects of each of the experience, by labeling the same emotion differently. The different cognitive processing strategies and the labels (feelings) used for them help to give semantically different experiential identifications for the emotion, though emotional arousal may have uniform psychobiological specifications. Cognitive interpretation of threat and dislike will configure emotional arousal with a negative valence, whereas recognition of intimacy and liking will configure the same emotional arousal with a positive valence. Emotional arousal occurs from sensory-motor contacts with reality, which is cognitively processed into experience.

### **Cognitive Appraisal of Emotional Arousal**

Another component that is generated from the experiences of sensory-motor contacts with reality is the self-differentiating and referencing process and creation of a resultant self-reflection or image (Mukundan, Ajayan 2011), which renders experiences personal. The listening brain monitoring the thought and speech outputs of the talking brain and generates verbal awareness (Mukundan 1999, 1998) of own thoughts and speech. That we have the habit of semantic transcoding of every non-verbal experience helps create verbal awareness of all those actions and responses, often along with memory of the process of thinking of the same. The best analogy of the self may be with a mirror reflection of all the processes, emotional arousal, their meanings created, and their memory. The self-image adds identity and strength to emotional experiences and the individual may become an inseparable identity, merging the self with the thoughts, cognitive processes, and response occurring and affecting emotional arousal. It may become difficult to separate the self-image from own thoughts, emotions, responses and actions and their recreations in remembrance. Emotions are molded and experienced with a positive or negative valence depending on the effects produced by the associated cognitive processing. They are treated positive or negative based on the pleasure – pain effects produced. Pleasure-pain effects are directed to the ‘self’ and considered experience of the ‘self’. The emotion may be labelled pleasure or pain as the behavioral effects result in such effects to the individual, which may inflict comfort or discomfort to the self. On the other hand, there are emotional arousals, which may not be associated with pleasurable or painful effects. Happiness, associated excitement with and without tears, and love may be such emotional arousal spells, which may appear without any personal benefits or discomforts. This is the nascent emotional arousal, which can be developed and maintained so only by special efforts, as those efforts are not expected to produce any pleasure – pain effects to the individual, which is the main focus of this presentation. Emotional arousal propels responses and behavior in individual (Yerkes, Dodson 1908; Mukundan et al. 2014). The choice of response or behavior depends on the interpretations of the presence of factors, which may include the behavior and responses of others, spatially and temporally related to an original event. The individual makes attempt to recreate the external and personally involved events semantically, which may also may end in the creation or transcoding of a new



meaning to the event. Understanding the logic used by others, which one may consider as causative, prompts him to think using the same logic or apply another logic with supportive justification for intended actions, which may propel one to respond in a certain way, and which one may consider appropriate reaction. Semantic configurations of explanations may occur before, during or even after responding or acting out. These reactions may cause extensive secondary psychophysiological effects in the individual, which may be detrimental to his peace of mind and living. The negative psychophysiological effects may become so very extensive and gruesome, affecting every walk-of-life of an individual. Cognitive psychotherapies and behavior therapies developed by Aron Beck (2011) and Albert Ellis (2008) became the choice method for semantic reorganization of original thoughts, which can take away or nullify the original emotion provoking effects, and the secondary psychophysiological responses become automatically extinct. The CBT or equivalent techniques may help to correct "errors in thinking such as overgeneralizing, magnifying negatives, minimizing positives and catastrophizing" with "more realistic and effective thoughts, thus decreasing emotional distress and self-defeating behavior" (Hassett, Gevirtz, 2009). Cognitive therapies laid all the emphasis on changing the cognitive pattern, which facilitated undesirable or unhealthy behavior (Brewin 1996, Beck 1998, Butler et al. 2006, Mosak, Maniaci 2008, Schacter et al. 2010, Hayes et al. 2011). Correcting or even changing those thoughts became the central theme of cognitive therapy, as the changed thoughts automatically changed understanding the context and meaning of the inputs received, and in turn, aroused and molded emotions and initiated behavioral responses, which were earlier diagnosed to be problematic to the individual. Cognitive behavior therapy has been designed and used for correcting most of psychiatric conditions, some of the neurodevelopmental inadequacies like ADHD and Autism and even for psychophysiological conditions like sleep apnea. The fact that cognitive therapies are so successfully applied for correction of psychological and physiological aberrations occurring because of incorrect or inadequate cognitive appraisal of inputs, clearly supports the contention that the related emotional arousal in its original format is merely a force for initiation of actions and responses and its specific nature is determined by the accompanying cognitive expectations and appraisals of the inputs and outputs.

Emotional arousal takes place during three major contexts like (1) when one wants to initiate as well as execute actions, (2) during recognition of sensory inputs, and (3) when remembrance of autobiographic episodes with or without original emotional effects take place. Of these, presence of emotional arousal is a necessity for initiation of actions, as it works as the driving force. Recognition of signal inputs and their semantic interpretations lead to modulation of emotional arousal. What is most important for understanding emotional arousal is the fact that emotion is originally an arousal or drive state, and it is identified by the cognitive resources of the system, and this identification decides the stream of behavior that may be initiated and executed. Learning to recognize may be one of very first cognitive processing steps that may indicate the initial stage of development of a mind. A person may easily learn to handle his original emotional arousal in a personally useful and relevant manner by interpreting the

emotional arousal as love, affection, discomfort or pain, thereby initiating supporting behavior. Learning such controls may gradually need intense personal efforts, which one may achieve, when one functions at strategically difficult levels for the age. Cognitive processing of sensory-motor events and associated emotional arousal is a normally learnt capability. We are habituated to assigning meanings to emotional arousal, whenever and wherever it happens, and the meanings thereby assigned to each emotion arousal is of special importance. The meanings to the individuals who have shared the effects of emotional arousal may be different as they may have been cognitively judged in different contexts. Learning to apply semantic processing in a critical manner beyond the natural personal interests of the individual is indeed difficult task, though this may easily be learnt and attempted by one, even if one is involved and interested in the event. A cognitive therapist tries to achieve this by convincing a patient to accept that his normal perception and the semantic interpretations of a recognized relationship as erroneous, and he is induced to accept another meaning, which does not need a response of the type he had earlier developed and which became an intense mental health problem. Intense meditation or brain-mind controls one learns to exercise may also help one to achieve such mental states for strategically defining the emotional arousal, instead of getting automatically drawn into a distressing meaning. What normally influence the semantic interpretations of individuals are their personal interests and their immediate and distant benefits or their absence coupled with distressful effects. The automatic neurogenesis of actions, when emotional arousal reaches certain critical level of potentiation (CLP) has already been discussed in detail elsewhere (Mukundan et al. 2014).

Interestingly, attention has been hardly focused on knowing or understanding the bare and primary emotional arousal, which one learns to cover up, mold, and label through cognitive processing, a method learnt and deployed by every growing child and grown up individual. This is an important aspect of psychosocial development of the human mind, which determines their emotional responses and experiences. This may be considered an important component of socialization. The socially reinforced mantle becomes the major focus of interest and attention, as it could help one identify and know about the effects of emotional arousal and experience the same. All of these could be designed and created by the self, which may aggressively facilitate or inhibit own behavior. One learns to process and identify the pleasantness - unpleasantness of the arousal to the self, which one learns to identify as emotional experience. The positive-negative valences are thereby personally processed and created. Further, semantic interpretations applied may reinforce and facilitate the driving effects of emotional arousal, which the individual could use for explanations of the navigational efforts and the responses one may make. Equally important as processing of the signals received in the brain, is the creative efforts of designing and assembling new meanings and functional organizations. The ideas thereby created may be fictional or real, and if real, they may change and add to the current realities of the nature, within which one lives. This helps to change the world that man lives in an alarming manner. Man could not only add new realities to the nature, but also attempt to

change the natural systems including biological functions. The psychological effects that could be created and experienced may become unique to each individual, and the interpretations self-applied may be considered acceptable or erroneous. Later correction by CBT therapists, computer-based programs, or by critical self-analysis may help the individual to replace the earlier erroneous thoughts that triggered stress and symptoms, by new thoughts, which help replace the distress by acceptable emotional effects. What is strikingly clear is the fact that cognitive dressing of emotional arousal is the art of living, one needs to learn and practice. The art of cognitive processing that one employs decides the complexity of the emotional arousal, and contributes to the experiences associated with the emotional arousal that one learns to acquire. The cognitive dressing may also be considered to reflect the wisdom of the individual, as one has the choice to learn and interpret the meanings of the signals received and decide responses in a creative manner for the well-being of the self and others. Meaning or relationship of sequentially arriving signals in the brain is generally fixed and unique, which needs to be critically decided. However, meaning of behavior of other individuals and living beings, and their semantic expressions need to be understood through personal cognitive logic. These meanings may mostly be decided by the logic of life one has created to live. Each person has the freedom and choice to create new meanings or accept meanings already in use by others. The complexity, vividness and the variety of the cognitive processing are the outcome of the criticality of the signal processing efforts one may apply. One has the choice to accept any of the systems of life already created by others and in use, accept the system in which one is born and brought up, or create/accept a new system.

### **Social Conditioning of Expression of Emotional Arousal**

Social conditioning trains an infant to recognize and use emotional arousal in a predetermined manner. Cognitive appraisal of emotional arousal takes place almost automatically in a growing child. Growing child learns to use emotional arousal as the driving force for all actions and responses while exploring the surrounding and engaging in exciting activities. Social conditioning automatically reinforces such efforts and emotional arousal gets automatically shaped in those accepted and challenging directions. One can choose a purpose and goals for life, decide action plans, and learn the skills and knowledge needed to execute the action plans, and carry out the execution. The emotional arousal pattern of the individual molds itself into this life pattern, chosen and adapted by one. What is strikingly important is the fact that erroneous cognitive interpretations can be corrected or changed by reinterpreting and substituting alternate processing effects. This is a clear and strong indication that emotional arousal in its original form is primarily a pure drive. Positive and negative valences appear only when the drive is cognitively processed by the individual to suit specific outcome effects. This processing may often occur in automatic manner, without conscious efforts, or with volitional involvement of the individual, which is indeed a conscious processing. Living a life with purpose and goals, making efforts to achieve those goals, may be considered the normal requirements and characteristics of human life. Philosophical thoughts, religions, and social systems created by man have tried to

provide specific fields for playing the games of life. A highly intellectual endeavor in this field is available from the very early Indian thoughts, which prescribe six major life styles, or domains for living, each called “yoga.” Of the six styles, the most referred ones are life styles for attaining goals of life through spiritual devotion, by carrying out duties of life, by leading self-disciplined life, and achieving goals through acquisition of knowledge. The different systems are not truly mutually exclusive or have any contradiction. One may accept a specific style as the major stream of life for the well-being of the self and allow simultaneously following other methods too.

Emotional arousal needs a more accurate scientific understanding, as it is a driving force of life. Narrating emotional arousal with positive and negative valences masked the understanding of its true position as a force of life. Brain Electrical Oscillations Signature (BEOS) profiling test used for measuring electrophysiological components of neurocognitive processes of remembrance of Experiential Knowledge (autobiographic memory), has shown presence of total emotional arousal as a transient state (Mukundan 2011, 2010, 2008, 2007) occurring when cued by a probe or stimulus. All neurocognitive processes are forced to become absent for short periods when an individual is cued with a statement referring to a highly distressing or traumatic event from the past. Neurocognitive processes related to semantic processing, accessing source memory, focusing on remembrance, neural binding related to recreation of sensory-motor imageries, etc. are all temporarily suppressed. Such neural deactivation pattern has been seen only when effort is made to retrieve highly traumatic or repressed information. Emotional arousal need to be accessed and monitored in a controlled manner for adequate neurocognitive processing to take place, whereas initiation of action is facilitated by increased drive. Action is automatically initiated when drive reaches a Critical Level of Potentiation (CLP). Increase in drive or emotional arousal may thereby initiate as well as help regulate sequence of actions. Emotional arousal is therefore a biological reality, needed for all sensory-motor processing as well as for sequential and simultaneous semantic processing to take place. Actions and responses are not initiated when emotional arousal is below the CLP range of activation. Excess of emotional arousal may also freeze neurocognitive processing, which is bound to affect the accuracy of semantic interpretations explaining attitudes and behavior/responses of others. Emotional arousal has been always differentiated from consciousness, which has been considered a semantic fallacy (Mukundan 2016). Most of emotional responses have been considered polyvagal or with positive or negative valences and awareness of self-recognition of the same, providing feelings of pleasure, aggressiveness, or distress, and fear to the individual. Consciousness is another dimension considered from a spiritual or religious point of view, which is not a scientifically proven state. Scientific reference to consciousness is made when awareness is biologically and psychologically considered. However, awareness is a function that is well explained from semantic and recognition points of view. The highest semantic weakness or error of the concept of consciousness has been that it does not refer to emotional arousal, which is a biological reality in all living beings. Though emotional arousal is a dynamic biological life force

within every living system, people preferred to call life the expression of a spiritual force, which came to be labelled consciousness. Consciousness is often proposed as an absolute universal entity; hence, its scientific understanding is not attempted or considered possible. Hence consciousness has been proposed as a semantic fallacy (Mukundan 2016).

### **Nascent Emotional Arousal**

Monitoring and recognition of nascent emotional arousal could be learnt only by practice. One must master the techniques of monitoring and knowing it before one can learn to shape emotional arousal. Emotional arousal without cognitive shading of the experience, its recognition, and awareness may occur in a few challenging sensory-motor conditions, when individual remains in a mental state of sensory-motor processing, when one must not find any need to make personally gainful or distressing cognitive processing. Two major practices that may help in dealing with nascent emotional arousal have been often considered/proposed as the practice of meditation and praying. Singing and listening to special music, and dancing may be additional practices, which produce nascent emotional arousal. The two methods were practiced by people from the ancient times, though praying was essentially a religious practice. There are different types of meditations; all of them take the individual practicing it to a state of stable mental alertness. In meditation, one follows a simple bodily activity and learns to be alert and monitor any specific sensory-motor processes associated with it. Several recent studies and their reviews (Wallace, Alan 2006; Jain *et al.* 2007; David, Kabat-Zinn 2008; Jha *et al.* 2010; Garland *et al.* 2009; Rapgay, Bystrisky 2009; Piet, Hougaard, 2011; Manicavasgar *et al.* 2011; Bedford 2012; Hortynska *et al.* 2016) have shown that meditation, especially the mindfulness type establish cognitive corrections in neuropsychiatric patients and emotional comforts in normal individuals. Continuously attending to and recognizing a simple body function, for e.g. breathing, strengthen the two closely linked cognitive processes. The practice further gives mental-cognitive capacity to control various bodily functions, as well as objectively process various sensory inputs and their implications. Cognitive labelling of emotional arousal could be carried out in a highly controlled manner, without becoming a prey to own inadequacies and weaknesses. Positive and negative valences in cognitive judgment, which mold emotional arousal in aggressive or opposite directions come under individual's command and control. Praying essentially is a sublime request to a bigger power, which the one who prays consider as the master of the universe, for his protection, kindness and love. Therefore no strongly molded emotional arousal is generated. Preying is also a musical practice, when one tries to express emotions in subtle and loving manner. Hence it came to be identified as an expression of "bhakti" or spiritual devotion in most of the religions. Listening to such music or chanting such lines produce emotional arousal, alertness as well as calmness of mind. Praying everyday twice or more, was a regular ancient practice in most religions, and the practice produce very positive emotional effects in the individual. The semantic explanations of religious effects and outcome are matters of different concern. What is psychophysiological and neurocognitively important is the emotional arousal effects of praying as well as listening to devotional music. Many of the

classical musical pieces have the same effects of generating nascent emotional arousal in the singer as well as listener. Being able to remain in emotionally aroused state without allowing the emotional arousal being cognitively molded so as to produce positive or negative valences may become an immensely enriching experience. This provides the individual with opportunity to be emotionally aroused without any excessive personal involvements of attachment or distress, drawn as personal experiences. In such contexts, emotional arousal ascends to a superior and sublime level, encouraging the best of objective cognitive molding, when one may shed tears with happiness. One could also make efforts to mold the emotional arousal in a positive direction as per the decisions made during nascent emotional arousal for obtaining maximum driving force for actions.

Happiness without any personal gains and tears accompanying the state may be considered to indicate one of such nascent emotional arousal in a person. During such emotional arousal, there may be no personal scope for a positive or negative valence in the cognitive processing, and the individual could accept acquisition of the emotional experience, without considering any benefits or ill effects, except emotionally reacting to the sensory-motor signals. One may succeed in attaining such mental or neurocognitive state by engaging in meditation, listening to, and/or singing music of certain type, and in exceptional experiences when one feels blissful and happy, without any personal gains. It is proposed that the music may be devotional type or opera music, as they have a special flow of signals. Both meditation and listening to such music are expected to enhance attentional arousal to the signals coming from outside and/or physiologically generated within the system. The emotional arousal created in this manner builds into a force within, but without any positive or negative cognitive valences of personal gains or losses. Emotional arousal will further facilitate attentional arousal, which will enhance the intake of signals and their recognition, as well as serve primarily as the fuel for engaging in motor actions and critical semantic processing. Body movements as in dancing may also generate such nascent emotional arousal, which is well known to provide the dancer controls on body movements and responses. The movement or dance is already in use as a therapeutic and self-control method. Cognitive molding of emotion indeed is used as an asset, as cognitive processing of sensory-motor events are important for contributing to the very development of human mind and for making experiences enriching, colorful and asset for living. Such experience related molding further contributes feedback controls for life-long pursuit of goals in life. We have already succeeded in using linear thinking for the creation of artificial intelligence. Difficulty is encountered for the creation of cognitive valences for emotional arousal and for nonlinear thinking, which remain essentially an asset of human mental processing.

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